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The contribution of personality to the ability to board a life raft

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Defence R&D Canada – Toronto

Technical Report

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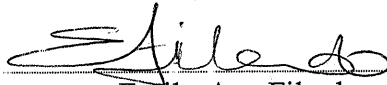
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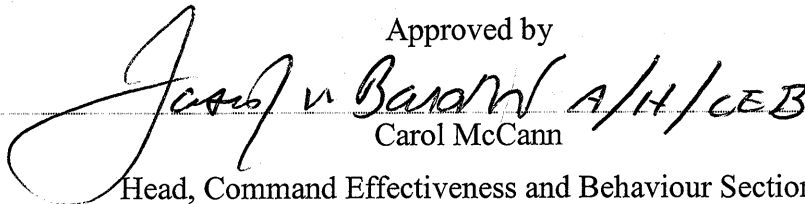
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Abstract

This report examines the extent to which personality characteristics, specifically extroversion, neuroticism, and conscientiousness, determine a person's ability to board a life raft, above what would be predicted by physical characteristics alone. Forty-eight healthy male and female participants attempted three different life raft boarding techniques after having completed measures of both physical and personality characteristics. Participants attempted to board using a ramp, a rope ladder, and unaided, over the side of the life raft. Hierarchical regression analyses indicated that none of the personality variables were significant predictors of time to enter the life raft over and above the effect of participants' height. With regards to the effort expended in attempting to board the life raft, neuroticism contributed to the prediction of effort in the over the side entry. There was also a trend suggesting that extroversion might play a role in effort expended in attempting to board using the ramp technique, the entry method seen as requiring the least amount of effort by both participants and objective raters. Future studies might investigate the role of personality in emergency situations that involve more realistic settings and that are not as dominated by physical attributes as in the present case of the life raft entry, such as exiting a burning building or responding to a medical crisis.

Résumé

Le présent rapport examine à quel point les traits de personnalité, plus précisément l'extraversion, le névrotisme et le fait d'être consciencieux, influent sur la capacité d'une personne de monter dans un canot de sauvetage, indépendamment des caractéristiques physiques. Quarante-huit participants des deux sexes ont essayé trois techniques d'embarquement différentes après avoir été soumis à des évaluations de leur personnalité et de leurs caractéristiques physiques. Les participants ont tenté de monter dans le canot de sauvetage à l'aide d'une rampe d'accès, d'une échelle de corde et sans aide (par le côté du canot). Des analyses de régression hiérarchique ont montré qu'aucune des variables liées à la personnalité ne permettait de prédire de façon appréciable le temps nécessaire pour monter dans un canot de sauvetage indépendamment de l'effet de la taille des participants. Toutefois, on a noté que le névrotisme contribuait à la prédiction du degré d'effort déployé pour embarquer sans aide, par le côté du canot de sauvetage. On a également observé une tendance selon laquelle l'extraversion joue un rôle dans le degré d'effort déployé pour monter à l'aide de la rampe d'accès, méthode considérée comme celle nécessitant le moins d'effort tant par les participants que par les évaluateurs objectifs. Des études futures pourraient porter sur l'effet de la personnalité dans des situations d'urgence plus réalistes dont l'issue dépend moins des caractéristiques physiques que dans le cas présent (p. ex. sortie d'un immeuble en feu ou intervention en cas de situation d'urgence médicale).

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Executive summary

Introduction

Most survival research has focused almost exclusively on the effects of physical, physiological and environmental factors on survival rate. However, there is evidence that after the immediate impact phase of an emergency, there are individual differences in the amount of time it takes to recover and respond appropriately to the situation [1]. It is unclear, however, precisely what underlies these individual differences. The present report describes an experiment that begins to address this question, asking whether personality characteristics might influence a person's ability to enter a life raft above and beyond the effects of physical characteristics. Designed to compliment research into the physical factors impacting life raft boarding ability [2], the present study specifically investigated the impact of three of the "Big Five" personality characteristics: extroversion (e.g., sociability, assertiveness, etc.), neuroticism (e.g., emotional volatility, high anxiousness, etc.), and conscientiousness (e.g., will to achieve, ability to plan and persist, etc.) [3].

These personality factors were selected for investigation because research on coping under stress indicates that individuals who score highly on measures of extroversion react more positively to both long- and short-term stress conditions, while individuals who score highly on measures of neuroticism react negatively under these same conditions [4] [5] [6]. Though little research has investigated the relationship between coping and conscientiousness, we propose that the characteristics associated with conscientiousness would lead to more positive coping styles and outcomes. A more adaptive coping style is likely to be associated with more adaptive responses in emergency situations, such as life raft boarding.

Research investigating the link between personality characteristics and exercise behaviour indicates that personality characteristics influence the amount of effort exerted. Success within physical activities, whether exercising or boarding a life raft, will largely be determined by the amount of effort one exerts. Extroversion and conscientiousness have been associated with higher levels of intensity and greater frequency in exercising, while high levels of neuroticism have been associated with lower levels of intensity and less frequent exercising.

In accordance with both of these lines of research, we hypothesized that high levels of extroversion and conscientiousness will be associated with higher effort levels when attempting to board a life raft and quicker entry times. Conversely, we expected that higher levels of neuroticism would be associated with lower effort levels and longer entry times.

Method

In an initial session, 24 men and 24 women were medically screened and measured on height, weight and strength characteristics. During a second session participants completed the Big Five Inventory (BFI), which measured extroversion, neuroticism, and conscientiousness. Upon completion, participants entered a warm water pool and attempted to board a life raft

anchored in the deep end using three different methods: i) use of a ramp, ii) use of a rope ladder, iii) unaided over the side of the raft. Participants who successfully boarded the life raft unaided also attempted a weighted, unaided boarding. The time it took to board was recorded. Participants also rated themselves on how much effort they had exerted and an independent rater assessed how much effort they appeared to exert. These measures of effort were combined to create an overall measure of expended effort.

Results/discussion

According to both the time and effort measures, the easiest entry method was the use of the ramp and the most difficult was over the side. The rope ladder was found to be of intermediate difficulty.

None of the personality variables were found to predict how long it took to enter the life raft, regardless of entry method, once height, which was previously found to be the best predictor of boarding success, was taken into account.

For effort expended, after taking height into account, higher neuroticism was found to predict less effort in the over the side entry. There seemed to also be some evidence that higher extroversion led to less effort in the ramp entry. The effort-personality relation suggested by the present results may be due to the relationship between exercise and extroversion. Past research indicates that extroverts exercise more frequently; therefore, in this least difficult task they could afford to expend less effort and still succeed because they were likely to be more fit than introverts.

Discussion. Caution must be taken when interpreting the results of this study because the small number of participants makes it very difficult to notice relationships that may exist in the data. Therefore, future studies may do well to include a larger sample of participants.

Furthermore, the results of this study may have limited generalizability to the larger question of the role of personality in survival behaviours because it was conducted in a non-emergency setting. Personality characteristics may play a more important role in the reactions of an individual in true emergency settings, or in emergency settings that are less dependent on physical attributes.

However while the results were, for the most part, non-significant, they do indicate that there may be some relationships present in the data. Further research may be able to uncover the specifics of these relationships. If this is so, it could mean that tailoring emergency training to individuals with vulnerable personalities might improve survival rates.

Filardo, E.-A., Pickering, D.I., Thompson, M.M. 2005. The contribution of personality to the ability to board a life raft. DRDC Toronto TR 2005-265. Defence R&D Canada – Toronto.

Sommaire

Introduction

La plupart des travaux de recherche sur la survie portent exclusivement sur les effets des facteurs physiques, physiologiques et environnementaux sur le taux de survie. Cependant, certaines données portent à croire qu'après l'impact immédiat d'une urgence, des différences individuelles influent sur le temps nécessaire pour se rétablir et réagir de façon appropriée à la situation [1]. On ne sait toutefois pas exactement ce qui est à l'origine de ces différences individuelles. Le présent rapport décrit une expérience qui vise à commencer à répondre à cette question en tentant de déterminer si les traits de personnalité influent, indépendamment des caractéristiques physiques, sur la capacité d'une personne de monter dans un canot de sauvetage. L'expérience, destinée à compléter la recherche sur les facteurs physiques qui jouent un rôle dans la capacité de monter dans un canot de sauvetage [2], portait spécifiquement sur l'effet de trois des grands traits de personnalité (« Big Five ») : l'extraversion (p. ex. sociabilité, affirmation de soi, etc.), le névrotisme (p. ex. volatilité émotionnelle, anxiété, etc.) et le fait d'être consciencieux (p. ex. volonté de réussir, capacité de planifier et de persister, etc.) [3].

Ces traits de personnalité ont été sélectionnés parce que la recherche sur l'adaptation au stress montre que les personnes qui obtiennent des scores élevés d'extraversion réagissent mieux aux conditions de stress à court et à long terme, tandis que les personnes qui ont des scores élevés de névrotisme réagissent négativement dans ces mêmes conditions [4] [5] [6]. Bien que peu d'études aient été effectuées sur la relation entre l'adaptation au stress et le fait d'être consciencieux, nous croyons que les traits de personnalité associés au fait d'être consciencieux favorisent des méthodes d'adaptation et des issues plus positives. Si une personne possède de bonnes capacités d'adaptation, il est probable qu'elle réagira mieux en situation d'urgence (p. ex. pour monter dans un canot de sauvetage).

La recherche sur le lien entre les traits de personnalité et l'activité physique a démontré que les traits de personnalité influent sur le degré d'effort déployé. Le succès d'une activité physique, qu'il s'agisse de faire de l'exercice ou de monter dans un canot de sauvetage, dépend en grande partie du degré d'effort fait par la personne. L'extraversion et le fait d'être consciencieux ont été associés à un degré d'intensité et à une fréquence accrues de l'activité physique, tandis que le névrotisme a été associé à un degré d'intensité et à une fréquence moindres de l'activité physique.

En nous inspirant de ces recherches, nous avons émis l'hypothèse selon laquelle l'extraversion et le fait d'être consciencieux sont associés à un degré d'effort accru et à un temps d'embarquement inférieur chez les personnes qui tentent de monter dans un canot de sauvetage. Inversement, nous avons prévu que le névrotisme serait associé à un degré d'effort moindre et à un temps d'embarquement plus long.

Méthodologie

Durant la première séance, nous avons soumis 24 hommes et 24 femmes à une évaluation médicale durant laquelle nous avons mesuré leur taille, leur poids et leur force physique. Durant la deuxième séance, les participants ont rempli le questionnaire *Big Five Inventory* (BFI), qui mesure l'extraversion, le névrotisme et le fait d'être consciencieux. Par la suite, les participants ont pénétré dans une piscine chauffée et tenté de monter dans un canot de sauvetage dans la section profonde de la piscine en utilisant trois méthodes différentes : 1) à l'aide d'une rampe d'accès; ii) à l'aide d'une échelle de corde; et iii) sans aide, par le côté du canot. Nous avons ensuite demandé aux participants qui avaient réussi à embarquer dans le canot de sauvetage sans aide de répéter l'exercice, mais cette fois avec un poids. Nous avons noté le temps nécessaire pour monter dans le canot de sauvetage. Le degré d'effort déployé par les participants a été coté par un évaluateur indépendant de même que par les participants eux-mêmes. Ces évaluations ont été combinées afin d'obtenir une mesure générale de l'effort.

Résultats/analyse

En fonction du temps et des mesures de l'effort, la méthode d'embarquement la plus facile a été celle avec la rampe d'accès et la plus difficile a été celle sans aide. La méthode faisant appel à l'échelle de corde a été modérément difficile.

Aucune des variables de la personnalité n'a permis de prédire le temps nécessaire pour monter dans le canot de sauvetage, peu importe la méthode employée, après la prise en compte de la taille, déjà reconnue comme la meilleure variable prédictive de la réussite.

Quant au degré d'effort déployé, après avoir pris en compte la taille, nous avons observé qu'un névrotisme plus marqué était associé à un degré d'effort moindre durant les tentatives d'embarquement sans aide. Certaines données portent aussi à croire qu'une forte extraversion a mené à un degré d'effort moindre durant les tentatives d'embarquement à l'aide de la rampe d'accès. La relation entre l'effort et la personnalité mise en évidence par les présents résultats peut s'expliquer par la relation entre l'activité physique et l'extraversion, puisque des études antérieures ont révélé que les personnes extraverties font davantage d'activité physique. Il est donc possible que les personnes ayant obtenu un score élevé d'extraversion n'aient pas eu à faire autant d'effort pour réussir la tâche que les personnes plus introverties puisqu'elles étaient en meilleure condition physique.

Analyse. Il faut interpréter les résultats de l'étude avec prudence, car en raison du petit nombre de participants, il est très difficile d'observer les relations éventuelles entre les données. C'est pourquoi il serait utile que les prochaines études sur ce sujet comptent un plus grand nombre de sujets.

De plus, il pourrait être difficile de généraliser les résultats de l'étude et de les appliquer au rôle de la personnalité dans les comportements de survie puisque l'étude n'a pas été menée dans une situation d'urgence. Il est possible que la personnalité influe davantage sur les réactions d'une personne dans les véritables situations d'urgence, ou du moins dans les situations dont l'issue est moins influencée par les caractéristiques physiques.

Bien que la plupart des résultats aient été non significatifs, les données évoquent l'existence de certaines relations. Des études futures permettront peut-être de mieux définir ces relations. Si c'est le cas, cela pourrait vouloir dire que l'adaptation de la formation dispensée aux secouristes d'urgence en fonction des personnalités vulnérables permettrait d'améliorer les taux de survie.

Filardo, E.-A., Pickering, D.I., Thompson, M.M. 2005. The contribution of personality to the ability to board a life raft. DRDC Toronto TR 2005-265. Defence R&D Canada – Toronto.

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Introduction

Background

Crises and emergency situations understandably entail a formidable amount of stress. The most urgent concern in these situations is often sheer survival. To date, most survival research has focused almost exclusively on the effects of physical, physiological and environmental factors on survival rate [1]. Nonetheless, some research has been devoted toward understanding the psychological factors implicated in both short-term and long-term survival. For instance, Leach [7] characterizes the acute or 'impact' phase of an emergency, that is the "phase when disaster strikes; when two ships collide; when part of an aircraft fuselage disintegrates; buildings tremble and begin to collapse; (p.7)", as involving an overload of all sensory perceptions. Here people almost universally report initially feeling overwhelmed, bewildered, and a sense of disbelief or dissociation (i.e., 'This can't be happening').

Immediately after the impact phase of an emergency, however, Leach [7] contends that critical individual differences determine one's response and the amount of time it takes to recover from an emergency and begin to respond appropriately to the conditions encountered. Approximately 75% of people will react to a crisis with continued bewilderment in which their attention will be restricted and their reasoning significantly impaired, behaving in a reflexive or automatic fashion. This group will take some time to recover, but largely will begin to function satisfactorily in an emergency, at least with adequate guidance. A further 10 to 15% of people will suffer even greater cognitive and emotional impairment and be unable to act at all or even display behaviour that is inappropriate, maladaptive or counter-productive to survival. These behaviours will often persist and are characterized by "uncontrolled weeping, confusion and paralyzing anxiety" [7, p.25]. The remaining people will react to emergencies by becoming relatively calm. Importantly "[t]hese people will be able to collect their thoughts quickly, their awareness of the situation will remain intact and their judgement and reasoning abilities will not be impaired to any significant extent. They will be able to assess the situation, make a plan, and act on it" [7, p.24]. Clearly, these individual differences have implications for the likelihood of surviving an emergency. Although these general individual differences in reactions to emergencies have been documented, the factors that underlie these differences have not been established. The current study was an attempt to begin to explore those psychological factors that may play a role in survival behaviours.

The present analyses are designed to compliment research by Tikuisis, Bell, Keefe, and Pope concerning physical characteristics that were associated with survivability [2]. Tikuisis et al. were particularly interested in acute survival situations occurring at sea, where the ability to successfully board a life raft almost certainly means the difference between life and death. In their research, height was found to be the most important predictor of ability to board a life raft, with taller participants being better able to board the life raft. However, given the importance that psychological factors can play in responding to emergencies, it may well be that individual differences also play a role in this ability. Thus, we sought to determine whether personality characteristics would play a part in determining one's ability to board a life raft, above what would be predicted by physical characteristics alone. If personality does

influence boarding behaviour it may be important to tailor boarding instructions in survival situations to meet the needs of individuals' whose personality predisposes them to less than optimal responses in the face of an emergency, thereby ensuring as high an overall survival rate as possible. We begin by describing the notion of individual difference in personality in general terms, and introducing the three personality dimensions under investigation in the present research.

Individual differences in personality

Individual differences are relatively enduring patterns of reactions and beliefs that affect the way experiences are comprehended and acted upon [8]. The relative stability of these responses means that individual differences typically predispose people to act and react in particular ways. Often referred to as personality dimensions due to their stability, they can act as moderators affecting resiliency or vulnerability in the face of stressful events [9].

One of the most widely accepted theories of personality is the 'Big Five' Model of Personality [10] [11]. Replicated in numerous studies [6] and showing cross-cultural stability [12], each of the five dimensions represents a broad category of human behavior and summarizes a large number of trait terms. In the present report we limit our discussion to the three Big Five factors that past research demonstrates might be most expected to relate to behaviors in survival situations: Extroversion, conscientiousness, and neuroticism.

Extroversion describes individuals who are characterized as being sociable, assertive, dominant and self-assured [10] [13]. A second dimension, conscientiousness, refers to an individual who has the will to achieve, who is able to plan, persist, and who purposefully strives towards his or her goals [14] [15]. A third dimension, neuroticism, describes individuals who are emotionally volatile, predominantly negative in their reactions and tend to experience high levels of anxiety [10]. With respect to the current study then, we might expect that self-assured individuals, such as those high in extroversion, might be less vulnerable to debilitating levels of stress in response to emergencies. Similarly, individuals high in conscientiousness might be able to both plan and persist in their attempts to board a life raft. Conversely, individuals high in neuroticism would likely be more vulnerable to anxiety and negative emotional and cognitive reactions in an emergency situation, perhaps to the extent of impairing their ability to board a life raft.

Empirical studies support the notion that certain 'Big Five' personality variables are associated with coping under stress, though the majority of that research involves psychological rather than physical stress in emergency situations per se. For instance, higher levels of extroversion has been shown to be associated with lower levels of maladaptive coping behaviours [3] [16], and is related to higher self-esteem during challenges [5]. Extroversion is also related to self-reports of fewer physical complaints and symptoms [4], and with higher levels of general well-being [17]. Together these findings suggest that extroverts tend to cope better with both short and long-term stress than do introverts.

There is much less research documenting the relation of conscientiousness to reactions to stress and coping attempts. However, the definition of conscientiousness might suggest that individuals who are higher in trait levels of conscientiousness will be more likely to persist

toward a goal, and to use problem-focused, rather than emotional-focused coping strategies, even in the face of stress or some obstacle in achieving that goal.

There is a wealth of literature supporting the hypothesis that neurotic individuals tend to fare poorly in a variety of stressful situations. For instance, neurotics were found to be less likely to use active problem-focused coping strategies [3] (see also [5] [18] [19] [20] [21]). In general, neuroticism is also associated with reports of poorer health as assessed by self report [4] [22], and more objective health measures [23] and with lower levels of well-being [4], all suggesting poorer coping overall.

Together this research suggests that we might expect that extroversion and conscientiousness are associated with more, and neuroticism with less, adaptive coping styles. In turn, extrapolating from the research literature summarized by Leach [7] it is reasonable to assume that these coping styles are, in turn, related to specific behaviours that are linked to survival in emergency situations.

A second line of psychological research suggests that the effects of these personality measures might be due to the impact they might have on the effort exerted. For instance, research has demonstrated a relation between personality and exercise behaviour (i.e., frequency and intensity of exercising), in which expended effort leads to success. Here extroversion and conscientiousness were positively related, while neuroticism was negatively related to exercising behaviour [24] [25]. Further, research by Ingledew, Markland, and Sheppard also indicated that while extroversion and conscientiousness were associated with intrinsic motives for exercising (i.e., exercising for the joy of exercising), neuroticism was associated with introjected motives for exercising (i.e., exercising because of a feeling of obligation, i.e., “I should exercise”) [26]. It stands to reason then, that a person who is exercising for intrinsic reasons might put more effort into their exercise because they enjoy it, while a person who is exercising for introjected reasons might put in the least amount of effort necessary to alleviate the guilt of not exercising or be more likely to give up an exercise regime. Thus, we also explore the personality-effort relation in the present study, hypothesizing that high levels of extroversion and conscientiousness will be associated with higher effort levels, while higher levels of neuroticism will be associated with lower effort levels, in life raft boarding attempts.

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Method

Participants

Forty-eight participants (24 males and 24 females) ranging in age from 18 to 52 years ($M = 34.7$, $sd = 9.59$) took part in this study. All participants were recruited via posters placed around DRDC Toronto and initially completed a medical screening to ensure that they were healthy and fit prior to the experiment. The Human Research Ethics Committee of Defence Research and Development Canada approved all study procedures.

Procedure

Participants took part in two separate sessions to complete the study. During the first session, participants were medically screened and measures of height (in centimetres), weight [percentage of body fat (PBF) and body mass index (BMI)] and strength (grip strength, biceps flexion, and latissimus pull-down) were taken. In the second session, participants completed the 'Big Five' measure of personality (described below) prior to the start of the life raft boarding trials.

Once the questionnaires had been completed, participants, dressed in their bathing suits, a tee shirt and a lifejacket, entered a warm water pool (approximately 27 degrees Celsius). At this point they were told to enter a life raft anchored in the deep-end (maximum depth of 4.7 meters) as quickly as possible to simulate the urgency experienced by survivors of an accident attempting to board a life raft at sea. Three counterbalanced entry methods were attempted by each of the participants: i) use of a ramp (RAMP), ii) use of a rope ladder (LADDER), and iii) over the side without aids (OTS). After each boarding attempt, participants swam to the side of the pool and rated the overall effort they had exerted. All participants were videotaped throughout their boarding attempts to confirm their boarding times and techniques. Participants entered the pool area and completed their boarding attempts individually to ensure that they were not learning optimal boarding techniques from earlier participants.

Participants who successfully boarded OTS were included in further trials in which they once again attempted an OTS boarding, this time wearing a weighted life jacket. This was accomplished by inserting lead shots of .5, 1 and 2 kg for a maximum weight-bearing load of 15 kg (just below the buoyancy limit of the life jacket) into five compartments in the life jacket. The initial weight used for participants' first weighted boarding depended on his or her predicted ability to board the life raft (see Tikuisis et al. [2] for calculation). Upon successfully or unsuccessfully boarding the life raft OTS (i.e., boarding within one minute) weight was added or removed, respectively, from the life jacket (see Tikuisis et al. [2] for the algorithm used to determine the amount of weight added or removed). This procedure was repeated for a third trial unless the participant had already reached the 15 kg limit. The boarding attempts were limited to three in order to reduce any possible effects of fatigue or practice.

Measures

Personality

Personality was measured using the extroversion, conscientiousness, and neuroticism subscales of the Big Five Inventory (BFI) [6]. The BFI asks participants to rate their agreement on a scale of 1 (strongly disagree) to 5 (strongly agree) with various characteristics that are used to complete the sentence “I see myself as someone who...”. Extroversion and neuroticism are each measured with eight items (e.g., “is talkative” and “worries a lot”, respectively), while conscientiousness is measured using nine items (e.g., “is a reliable worker”).

Effort

Subjective effort

Participants’ ratings of the effort they had expended were verbally indicated on a scale ranging from 0 (no effort) to 10 (maximal effort) after each boarding attempt.

Objective effort

An independent rater viewed the videotaped performance of each participant and rated them on a scale from 1 (low effort) to 3 (high effort) on their apparent effort expended in attempting to board the life raft OTS. The criteria used to determine the objective effort rating were: i) the continuity of effort (continuous or sporadic); ii) the level of motivation and engagement in the boarding effort; iii) the variety of techniques used (e.g., if one technique did not work, did they attempt a different technique?).

Overall effort.

An overall effort score was created by first rescaling the objective scale to match the subjective scale and then generating a composite score based on the two measures. This was justified because the two measures of effort were highly correlated (.57) and a reliability analysis indicated that an overall effort measure based on a composite of both measures was internally consistent ($\alpha = .85$). In other words, the correlations among the individual measures of subjective and objective effort were high enough to warrant treating them as a single scale. It was this overall effort score that was used in later analyses.

Overall strength-to-mass ratio

The various measures of hand, arm and back strength were combined to create an overall upper body strength-to-mass ratio (STMR; see Tikuisis et al. [2] for the specific formula used in the calculation of this measure). Only the upper body strength-to-mass ratio was measured because it was these muscles that were deemed particularly relevant for the task of boarding a life raft.

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Results

Overview

We conducted a series of preliminary analyses. These included reliability analyses on each of the personality measures to ensure that their internal consistency was sufficient for further investigation in the present study. Pearson correlations then revealed the interrelationships among the variables assessed. Finally, we explored the effect that gender might play in the present research. These analyses were conducted as gender differences are often reported in the physiological stress literature. However, we wished to determine if effects in the present study were due to gender differences per se, or if they were largely explained by physical variables.

Our primary question of interest in the present research is whether these personality variables would play a role in life raft boarding time and effort, above and beyond the effect of the physical characteristics. Because height was found in past research to be the single best physical predictor of ability to board a life raft only height was included in the current regression analyses [2].¹

Recall, three boarding methods were used in the study: OTS, ramp, and ladder. Thus, for each set of analyses we initially conducted paired t-tests to determine whether our dependent variables of time and effort varied by life raft boarding method. Where significant differences emerged, subsequent analyses were conducted separately for each boarding method.

To test whether neuroticism, extroversion, or conscientiousness played a role in how much time it took or effort a person exerted in order to board a life raft, a series of hierarchical regression analyses were conducted. A strict test of our question involves regressions that specifically assess whether these personality dimensions would predict survival behaviours over and above that of height. Thus, in each of the following analyses, height was entered into the regression equation in the first step, followed by each of the personality factors, which were entered stepwise in the second step. In this way, we ensured that personality variables would only appear in the regression equation if their contribution to participants' time to enter the life raft and their effort ratings (i.e., the dependent variables in the regressions) was above and beyond what was accounted for by height.

¹ Analyses were conducted using only STMR and both STMR and height in the initial step in the regression. The results, however, were not different from those using height only. Therefore, because previous research has shown height to be the single best physiological predictor of boarding success, only height was included in the regression analyses reported here.

Preliminary analyses

Reliabilities and descriptive statistics

The means, standard deviations, reliabilities (where applicable) for the various measures can be found in Table 1 along with the correlations among these variables. As Table 1 shows, the internal consistencies of each of the BFI subscales were good with values ranging from .78 to .85. All of the means are within the range expected for a normal population, as was the pattern of correlations among the personality variables (i.e., a positive correlation between extroversion and conscientiousness and a negative correlation between both of these measures and neuroticism).² There was a significant positive correlation between the physiological variables (height and STMR) as would be expected.

Table 1. Means, standard deviations, reliabilities and correlations among the various measures used in the study.

Variable	1	2	3	4	5	6	7	8
1. Height	--							
2. STMR	.39*	--						
3. Extroversion	-.28*	.05	--					
4. Neuroticism	.05	-.15	-.46*	--				
5. Conscientiousness	.02	.18	.29*	-.46*	--			
6. OTS effort	-.34*	-.23	.21	-.34*	.03	--		
7. Ladder entry effort	-.36*	-.32*	.04	-.23	.08	.59	--	
8. Ramp entry effort	.30*	.04	-.33*	-.02	-.13	.21	.28	--
Alpha	--	--	.85	.85	.78	.85	--	--
Mean	171.77	.56	26.77	19.10	36.24	7.22	5.26	4.01
SD	7.28	.10	5.76	6.12	4.88	1.47	2.03	2.02

Note. * $p < .05$

² The correlations between the personality variables were highly significant which might make multicollinearity a concern within the regression analyses (i.e., because of the overlap among the variables no one variable is significant because there is little unique variance attributable to any one of them). This becomes particularly problematic with correlations greater than .70, however, to ensure there were no multicollinearity problems in the current study, individual regression analyses were conducted entering each of the personality variables separately. The results of these alternate analyses did not differ significantly from the analyses reported in this paper.

Gender

As Table 2 indicates, there were gender differences apparent in this study. Men and women differed significantly in their height and STMR [$t(46) = 4.98$ and 7.40 , respectively, $ps < .001$]. Not surprisingly, men were both taller ($M = 176.04$, $sd = 5.24$) and stronger ($M = .63$, $sd = .07$) than women ($M = 167.5$, $sd = 6.56$ for height, $M = .49$, $sd = .07$ for STMR). There was no difference between men and women on any of the personality variables (all $ts < 1$).

While men and women did differ significantly in the various measures of effort expended (see Table 2), this was likely due, for the most part, to the difference previously mentioned in their height. As shown by Tikuisis et al., boarding a life raft appeared to be easier for taller individuals as measured by time to board [2].³

It is interesting to note, however, that in the ramp boarding attempt, females expended less effort than males. This may be due to a contrast effect. Indeed, our supplementary analyses produced results consistent with this explanation. As previously mentioned, men had significantly higher STMR than women. Thus, the other boarding procedures may have been particularly difficult for females because of the upper body strength requirements, making the ramp boarding, which required much less upper body strength than either of the other boarding methods, seem particularly effortless in contrast. While the procedures for boarding were counterbalanced, two-thirds of the participants would have had at least one other method for comparison.

Table 2. *T-tests for equality of means between men and women for the various measures of expended effort.*

	Means		<i>T</i>	df	Sig.
	Males	Females			
OTS effort	6.751	7.697	2.340	46	.024
Ladder attempt effort	4.478	6.068	2.827	43	.007
Ramp attempt effort	4.563	3.381	-2.021	43	.050

The relationship of personality to time to board the life raft

A series of paired t-tests indicated that each method of entry differed in its difficulty level as indicated by the time it took to enter the life raft. Not surprisingly, the weighted OTS entry took the longest amount of time ($M = 26.73$, $sd = 14.52$),

³ All reported analyses were conducted using gender as a covariate, however, including gender in the analysis did not significantly change the findings, therefore, all analyses reported exclude gender as a variable.

followed by the unweighted OTS entry ($M = 22.50$, $sd = 14.31$), LADDER entry ($M = 14.11$, $sd = 7.32$), and, finally, RAMP entry ($M = 11.02$, $sd = 7.77$).

Hierarchical regressions were next conducted for each entry method in which height was entered in the first step and the personality variables were entered, stepwise, in the second step. None of the personality variables were significant predictors of time to enter the life raft for any of the entry methods once height was taken into account (see Table 3).

Table 3. Regression analyses for the time to board for each boarding procedure.

Variable	<i>B</i>	<i>SE B</i>	<i>T</i>	<i>p</i>	ΔR^2
OTS weighted time to board					
Height	-.524	.313	-1.673	.10	.07
Conscientiousness	.203	--	1.288	.21	--
Neuroticism	-.114	--	-.707	.48	--
Extroversion	-.058	--	-.336	.74	--
OTS unweighted time to board					
Height	-.726	.297	-2.447	.02	.13
Conscientiousness	-.149	--	-.996	.33	--
Neuroticism	.120	--	.795	.43	--
Extroversion	.001	--	.005	.99	--
Ladder time to board					
Height	-.489	.136	-3.593	.00	.23
Extroversion	-.080	--	-.562	.58	--
Neuroticism	-.052	--	-.380	.71	--
Conscientiousness	.043	--	.321	.75	--
Ramp time to board					
Height	.172	.156	1.104	.28	.03
Extroversion	-.215	--	-1.378	.17	--
Conscientiousness	-.174	--	-1.163	.25	--
Neuroticism	.057	--	.374	.71	--

The relationship of personality to effort expended to board the life raft

A final set of analyses was conducted to determine if personality might contribute to effort ratings, above that attributable to height. We initially conducted paired t-tests to examine the differences in mean effort ratings across the various entry methods. Results revealed that each of the effort ratings was significantly different from each other. As Table 1 shows, the effort rating was the highest in the OTS method, with the least amount of effort reported in the ramp method of entry, and the ladder method producing intermediate effort ratings.

The results for each of the regressions can be found in Table 4. As can be seen from these analyses, once height was accounted for, the only significant finding was for the rating of effort for the OTS boarding. For this entry method, neuroticism was found to contribute to the overall effort even after height was taken into account. There was also a trend towards significance for extroversion in the ramp entry ($p = .08$).

Table 4. Regression analyses for the effort measures for each boarding procedure.

Variable	<i>B</i>	<i>SE B</i>	<i>t</i>	<i>p</i>	ΔR^2
OTS effort					
Height	-.065	.026	-2.464	.02	.12
Neuroticism	-.079	.032	-2.496	.02	.10
Conscientiousness	-.147	--	-.992	.33	--
Extroversion	-.036	--	.231	.82	--
Ladder attempt effort					
Height	-.103	.040	-2.545	.01	.13
Neuroticism	-.194	--	-1.370	.18	--
Conscientiousness	.087	--	.606	.55	--
Extroversion	-.080	--	-.534	.60	--
Ramp attempt effort					
Height	.083	.041	2.032	.05	.09
Extroversion	-.265	--	-1.772	.08	--
Conscientiousness	-.129	--	-.884	.38	--
Neuroticism	-.048	--	-.328	.74	--

Note. $N = 48$ for OTS entry and $N = 45$ for ladder and ramp entry.

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Discussion

The current study was undertaken in an effort to understand whether particular personality variables might be implicated in specific behaviours associated with survival associated with three methods of life raft boarding, specifically time to board a raft and ratings of effort related to boarding. To our knowledge, no research looking at the personality predictors of life raft entry success has been conducted to date. However, previous research has revealed consistent effects for the role of personality in coping behaviour in other contexts [3] [9]. Thus, the present research proceeded under the assumption that similar psychological mechanisms might play some role in coping behaviours that are central to maritime survival situations. More specifically, we hypothesized that the more adaptive coping styles associated with extroversion and conscientiousness also might be related to more overall effectiveness in survival situations. Conversely, the high level of anxiety inherent in neuroticism might interfere with cognitive focus and negatively impacting life raft boarding ability. A second line of research literature revealed that neuroticism, extroversion, and conscientiousness were related to exercise behaviour [24] [25], indicating that these characteristics might be related to ratings of effort in boarding a life raft. Two effort indices were employed here: one a subjective measure given by each participant after each trial, and an objective effort rating made by an independent rater.

Hierarchical regression analyses showed that the personality variables of extroversion, conscientiousness and neuroticism were unrelated to the amount of time it took participants to board the life raft using the various entry methods once height had been taken into account.

In the case of the OTS boardings, participants who were higher in neuroticism appeared to exert less effort than those lower in neuroticism, which is consistent with past research on effort in exercise behaviour. There was also a trend in the ramp entry analysis that appeared to indicate that extroversion might be a significant predictor of exerted effort in this particular boarding method. This finding, however, was in the opposite direction from what would be expected from past research on exercise behaviour. The analysis indicated that those individuals who were higher in extroversion exerted less effort than participants who were lower in extroversion. One possible explanation for this apparent contradiction could be the link between extroversion and exercise. If participants who are extroverted tend to exercise more, they likely are superior in physical fitness than introverts. It might be this third variable that accounts for the relationship between extroversion and effort. The difference between individuals who were more and less fit was likely to be seen in the least difficult task, the ramp entry, because the most fit individuals could afford to expend less effort and still succeed in the task. Those who were less physically fit felt they had exerted a great deal of effort even in the least difficult of tasks.

Important considerations and limitations

While the results of this study are interesting, there are important limitations and considerations that must be kept in mind concerning the present findings. First of all, it must be acknowledged that the number of respondents used in this study was extremely low for

conclusions to be drawn concerning the role of personality. The limited number of significant results uncovered in the present study was almost certainly due in part to the low sample size and thus the low statistical power of the study. In other words, there may have been noteworthy relationships between the personality variables and life raft boarding, however, the small sample size made these relationships difficult to detect. Unfortunately, we had no input into issues of sample size. Therefore, while this study may be perhaps useful as a pilot study, future researchers interested in the links between physiology and psychological processes would be well advised to carefully consider issues of sample size in their research designs.

Moreover, it is extremely important to note that the study was conducted in a non-emergency setting, in tepid, calm water. Thus, the results obtained within this very artificial setting indicate that there is a very minimal role played by personality above and beyond height when entering a life raft. However, it is difficult to generalize these findings to a real emergency setting. In that case, personality may play a greater role in determining entry success. Factors, such as the panic inherent in emergency situations, may give individuals with different personality types an advantage or disadvantage, depending on how they deal with that panic.

A further factor that was not considered in this study was the naivety of the participants. That is, there was no assessment of the participants past experience with water situations, including those that may have dealt with similar situations or training relevant to such situations. For instance, this study was conducted in a military setting and it is likely that at least some of the volunteers were military personnel who may have had previous experience entering a life raft as part of their military training. This degree of comfort with the situation in general or previous training/practice may have negated the influence of personality in the present research. In a true emergency situation, however, it is unlikely that many of the people attempting to board a life raft would have previously had that experience and, therefore, personality might become a more important factor than what was indicated here.

Future research in this field might look at how personality might interact with the setting within which the study is conducted (calm or turbulent, cold or warm, etc.), as well as the difficulty of the entry, and with participants who are clearly naive or have little experience. Nonetheless, the findings of this initial study do indicate some areas for future exploration. Specifically, the trend towards the difficulty of the type of entry influencing the importance of various personality factors, with neuroticism coming into play in difficult entries and extroversion coming into play in relatively easy entries, warrants further investigation.

While the present results indicate that physical characteristics, namely height, was the only factor consistently influencing life raft boarding in the present study, it should be considered that personality may play a more crucial role in reactions to other emergency situations that do not involve physical attributes. That is, it is undoubtedly the case that some physical aspects will be crucial in the unassisted hauling of oneself into a life raft. However, there is a wide range of emergency situations, such as exiting a burning building, crashed plane, etc., where physical strength will be less of an issue in survival. Future research may well find that psychological characteristics are extremely important to survival in these situations. As noted in the introduction of this report, if personality is established as important in reactions to emergency situations, it will be important to tailor routine emergency training and instructions to best meet the needs of those most vulnerable in survival situations.

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(U) This report examines the extent to which personality characteristics, specifically extroversion, neuroticism, and conscientiousness, determine a person's ability to board a life raft, above what would be predicted by physical characteristics alone. Forty-eight healthy male and female participants attempted three different life raft boarding techniques after having completed measures of both physical and personality characteristics. Participants attempted to board using a ramp, a rope ladder, and unaided, over the side of the life raft. Hierarchical regression analyses indicated that none of the personality variables were significant predictors of time to enter the life raft over and above the effect of participants' height. With regards to the effort expended in attempting to board the life raft, neuroticism contributed to the prediction of effort in the over the side entry. There was also a trend suggesting that extroversion might play a role in effort expended in attempting to board using the ramp technique, the entry method seen as requiring the least amount of effort by both participants and objective raters. Future studies might investigate the role of personality in emergency situations that involve more realistic settings and that are not as dominated by physical attributes as in the present case of the life raft entry, such as exiting a burning building or responding to a medical crisis.

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